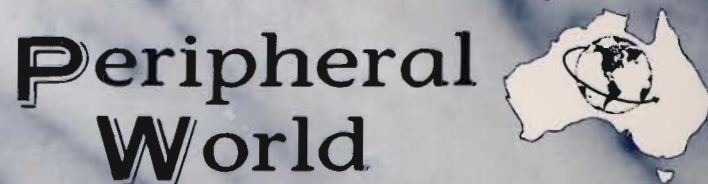




User Guide

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POWERCOPY PROFESSIONAL VERSION 3.03a by Geoff Lohrere

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Notes From The Author

Unfortunately it was necessary to place disk protection on PowerCopy, however if the Hardware Power Device is fitted, the disk protection will be bypassed. This means that if running PowerCopy from a harddrive the original disk will not be required to run PowerCopy. It is advisable to run PowerCopy before plugging in the Hardware Power Device to test that the disk protection passes. If the protection fails, please notify the author or place of purchase.

The files 'Narrator.device' and 'Translator.library' which PowerCopy needs for speech are no longer licensed by Commodore and as a result can no longer be distributed with the PowerCopy disk. If the speech option is desired, copy the 'Narrator.device' into the 'Devs' directory and the 'Translator.library' into the 'Libs' directory on the PowerCopy disk or your harddrive if running PowerCopy from a harddrive. These two files can be found on the boot disk of 'WorkBench1.2', 'WorkBench1.3' or the first release of 'WorkBench2.0'. The 'Disable loading of speech' gadget in the Preferences window will have to be turned off also and saved using Save defaults for speech to load.

If you have problems backing up an **Original** software package, please feel free to send the original disks to the author, so a Parameter file can be created. Sending blank disks with the originals for testing the Parameter file would also be appreciated. Please enclose a pre-STAMPED, return addressed jiffy bag to return your disks. For the authors current address or phone number contact Peripheral World or call Melbourne Directory Assistance, Victoria, Australia.

Loading PowerCopy Professional

Insert the PowerCopy program disk at the WorkBench prompt or load PowerCopy from WorkBench. If there is insufficient memory or required files are not found, the screen is beeped and an error message printed if executed from a CLI window. If the Hardware Power Device is not plugged in, during the PowerCopy disk protection check the Drive Ready and Index Pulse signals are tested and error messages displayed if faults are found. Faults may not be apparent here as Index and Drive Ready signals are not normally used by DOS. On completion of loading PowerCopy, if the virus vectors are not clear, PowerCopy will report the possibility of a Virus in memory! As PowerCopy requires a PAL window, if your Amiga powers up in NTSC mode, PowerCopy will load with an Interlaced screen. The file PALNTSC on PowerCopy will force a PAL window if your Amiga is fitted with an 8372a or later Agnus. NTSC machines using KickStart 2.0 or greater require the PAL monitor driver in the monitors drawer before the file PALNTSC can be used to switch the display to PAL. Note: If booting from the PowerCopy program disk, the PAL monitor driver which is available from the Devs/Monitors drawer (directory) is auto executed before the file PALNTSC is run. See also Harddrive Installation.

PowerCopy Quick Tutorial

PowerCopy is an extremely powerful program with a multitude of options and tools which to many may seem intimidating at first. PowerCopy however, with normal defaults set, which includes Backup mode Quick, Hard device Auto and Index Copy Auto is very automatic and will backup the majority of software by simply inserting the source disk in drive 0 and target disk in drive 1, or drive 2 if drive 1 does not exist, and clicking the gadget labeled 'START' or pressing the large Enter key. If you want to verify the disk being backed up, click on the gadget labeled 'Verify Data' to turn verify On.

If the backup did not work, use Load Parameter from the pull down menu labeled Project and look through the list to see if a Parameter file is present for the software being backed up. Backup mode Parameter is auto selected after loading a Parameter file so again just select 'START' to begin the backup. If a Parameter file does not exist try the backup modes IndexSync, Nibble, Sector and SyncScan in that order. These are selected by clicking on the gadget labeled Backup. If the backup still fails, reading all the instructions is advised or send the disks to the author to have a Parameter file created.

Instruction Summary And PowerCopy Facts

The following is a condensed list of all PowerCopy functions. For more detailed information, read the instructions following this section.

- Program control is by pull down menus, click on gadgets and keyboard control.
- To edit the string gadgets 'Format Name', 'Mem Address', 'Retry Errors', 'Data Length', 'Verify Count' and 'SyncWord' click on and delete or backspace the current contents and enter the new values as per normal string gadgets.
- The Start and End tracks are set by clicking the left mouse button on the desired coordinate in the track error grids. Use the 'Side 0' grid for the Start Track and the 'Side 1' grid for setting the End Track. Double clicking the same coordinate will set the Start and End tracks to the same track.
- Some disk duplicating software give an error '0' if the software thinks it has duplicated the track okay, rather than giving the true track error. With PowerCopy, when backing up non DOS disks, errors displayed in the error grids are relative to a standard Amiga DOS track, so errors displayed for a non DOS protected track are for reference only and do not reflect backup problems.
- The labels 'Format Name', 'Mem Address', 'Retry Errors', 'Drive Speed', 'Track Range', 'Verify Count', 'Read Length', 'Data Length' and 'SyncWord' are mouse click on gadgets to set default values except 'Drive Speed' which will select the drive speed test function as per 'Speed Test' from the 'DRIVES' gadget.

• Source and Target drives are selected using the gadgets 'Source Drive', 'Target Drive', 'DRIVES' and 'DEVICE' or using keys F1-F5 for source and F6-F10 for target. Shift F5 and Shift F10 will select DEV instead of RAM. A mouse button activated pull down menu is also available.

• The arrow gadget labeled 'Swap Drives' reverses the source and target drives.

• If sufficient memory is available, a whole disk can be written to target drive RAM and then written back to as many disks as there are drives, using multiple targets. This will result in very fast multiple disk copying of PD software.

• If you have a Device such as a harddrive or writable CD ROM drive, and have PD (Public Domain) software that regularly needs to be duplicated, you can store these disks onto the available DEV using target drive DEV. When required source drive DEV can be written to as many disks as there are drives with multiple targets. If making multiple backups of the same disk, copy source drive DEV to target drive RAM, and then source drive RAM to the desired floppy drives, as RAM will be substantially faster than any available device.

• When using target drive DEV, different directories can be used to store as many disks as space permits. Disks are stored as individual track files as this requires no memory overheads and gives greater speed and flexibility.

• Using source or target drive RAM or DEV you can Check, Format, Copy, Erase, Write memory and KickStart, Read and Write Tracks, Install Bootblock, Rename DOS Disk, Disk Info, Disk Compare and Copy Selected. Any new write operation to target drive RAM or DEV will erase the drive, treating it as a blank disk, with the exception of Copy Selected, Install Boot, Rename Disk and Quick Format. Copy Selected allows recopying tracks with errors after a backup, without losing the other tracks copied to RAM or DEV. Sufficient RAM or Device space (DEV is commonly a harddrive, CD ROM or RAM:) is required to take full advantage of this feature. DOS requires .9 meg minimum free memory.

• Full disk operations on Amiga DOS tracks, using source drive RAM will be approximately five seconds faster if at least 1.9 meg of memory is free.

• When writing DOS tracks to target drive RAM each track uses 5632 bytes of normal data or 11976 bytes of MFM data if at least 1.9 meg of memory is free.

• Full disk operations using source or target drive RAM or DEV will be approximately one second faster if true fast memory is available.

• When writing non DOS tracks to target RAM or DEV, the amount of memory used for each track will be the full track length or the 'Data Length' value if not zero. The amount of memory required to store a non DOS disk will vary, but the average amount of free memory or space required is approximately 2 meg.

• If unable to open a window in PowerCopy because all free memory has been used by target drive RAM, use Clear RAM from the 'DEVICE' gadget or the 'ERASE' gadget to erase target drive RAM, which will also free the RAM drive memory.

• If nearly all free memory has been used by target drive RAM, some or all of the mouse menu button activated pull down menus may not be available.

• Selecting the gadget labeled 'MEM' displays the amount of available Chip, Fast and total memory.

• The clock in the bottom error grid can be toggled between realtime and starting the session clock by selecting the gadget labeled 'CLOCK'.

• The 'Window Close Gadget' in the top left corner of the screen can be used to abort the last function selected or exit PowerCopy if not in a function.

• The two square gadgets in the top right hand corner of the PowerCopy screen are to move the screen to the rear and raise and lower the PowerCopy screen.

• All of the On and Off options, the Clock, MEM, Screen Gadgets and the 'Close Window Gadget' are active at all times, excluding file access.

• A disk backup is started by selecting the 'START' gadget, pressing the main Enter (Return) key or the Enter key on the numeric keypad if not assigned.

• Backup mode 'QUICK' is the fastest backup mode in PowerCopy and will backup nearly all software with normal defaults.

• Index Copy On waits for the disk index pulse before looking for a SyncWord when reading a track and waits for the index pulse before writing a track. Index Copy can be On to backup nearly all software, but the disk backup will be slower than necessary if Index Copy was not required. Index Copy Auto tests and reads each track with Index Copy On or Off as required with at least 98 percent accuracy. Note: Backup mode Parameter overrides Index Copy Auto.

• Backup mode 'QUICKPLUS' is identical to 'QUICK' except the gap on DOS tracks is copied also. Data in the gap was used occasionally with old protections.

• Backup mode 'MULTIPLE' is for writing to several target drives simultaneously. Multiple also has a fast mode to backup DOS disks in 38 to 65 seconds using 'Hard Device' On, but all targets selected must be behind the Hardware Device

or the normal read/write routines will be used and the backup will be slower. Select Multiple targets from the gadgets 'Multiples', 'ALL', 'AES', 'DRIVES', 'DEVICE' or using the keys 0,1,2 and 3.

- Backup mode 'INDEXSYNC' disables use of SyncWords and copies from one index pulse to the next, exactly one disk rotation. 'INDEXSYNC' mode is automatic if no known SyncWord is found and may sometimes be needed to backup a disk.

- Backup mode 'SECTOR' is similar to 'POWER NIBBLE' but is for software with unknown sector formats. An Amiga DOS track has a known sector format.

- Backup mode 'NIBBLE' is the most powerful backup mode which may be needed with some protections. The need for 'SECTOR' or 'NIBBLE' backup should be rare.

- Backup mode 'PARAMETER' will backup a disk using the last loaded parameter. A large growing selection of parameters is supplied with the PowerCopy disk, but the majority of these are supplied for convenience rather than necessity.

- A SyncWord is a special word of data used by computers to find the start of data on a disk track. The standard SyncWord used is \$4489. PowerCopy will automatically scan for other SyncWords if the standard \$4489 is not found.

- SyncWords that are auto scanned for and used with backup mode 'SYNCSAN' are contained in the file PowerCopy.SyncWords in the 'S' directory. SyncWords can be added using functions 'Edit SyncWords' and 'Save SyncWords'. If this file is not present a default list of internal SyncWords is used.

- Backup mode 'SYNCSAN' creates a list of SyncWords found on each track. This mode of backup uses the last SyncWord found on each track, instead of the first to backup each track. To display the SyncWords found on each track after a SyncScan backup, press the 'S' key from the EDIT parameters window.

- Hard Device On may sometimes be needed for hard to detect or new protections, otherwise unless Hard Device Off is required, selecting Auto is recommended.

- If the Power Device is going to be used, the selected target must be behind the Power Device, while any drives before the Device must be the source drive.

- If you cannot verify data written to a 5¼inch target drive with 'Hard Device' Off and the Hardware Power Device plugged in, but can read prewritten DOS disks alright, you may need a 4.7k pull up resistor connected from pin 22 (Write Data) on the disk drive itself, to the 5 volt supply rail (VCC). If this resistor has to be fitted, using a qualified technician is recommended.

- To test if the Hardware Power Device is working correctly, turn 'Hard Device' On, 'Verify Data' On, insert a DOS disk in the source drive, a blank disk in the target drive and select 'START' to begin the backup. If PowerCopy cannot detect the Power Device the message 'Hardware Power Device is required' will be displayed. If no 'X' (bad verify errors) are given after a few tracks, the Power Device can be considered to be fully operational. Note: The disk drive port on the Amiga has small ceramic filter devices to remove unwanted noise from the signal lines. Occasionally these filters cause more noise than they remove which can be even more emphasised with the Power Device fitted. If you have strange problems with the Power Device fitted, try the Device on a friends Amiga. If the Device works alright on other Amigas you may need to have these filters removed as most Commodore service centres recommend doing.

- The message 'Analyzing source and target drive speed' will be displayed before first use of the Power Device and the Amiga's power LED will be dimmed to indicate when the Hardware Device is actually in use transferring disk data.

- If the message 'Left mouse: Abort index alignment, Right: Abort copy' is given and the displayed difference in drive speeds is close to 00000 with the index alignment graph hovering in the one place, abort the backup, turn off 'Auto index alignment accuracy' from the Prefs window, set 'Index alignment accuracy' to a value of at least 50 and the 'Index align motor pulse' to about 25000. See Index align motor pulse for more information.

- 'Fix Errors' will fix as many sectors on an Amiga DOS track as possible. If no sectors can be fixed or the track is not Amiga DOS the target track will be formatted. Fixed errors will be white instead of black with standard palette.

- 'Fix Errors' if On, will be turned Off automatically if 'Hard Device' is On as it is impossible to fix errors when transferring data direct between drives.

- 'Fix Errors' if On, will be turned Off automatically if using 'COMPARE' as fix errors would change the contents of the read data causing a bad compare.

- 'Fix Errors' Auto can be used to convert blank source tracks back to formatted target tracks with DOS disks. For example when using the BitMap copy function from copy SELECTed to conserve space on a harddrive or CD ROM, when copying source drive DEV back to floppy or floppies, any unused formatted tracks which were not copied will be converted back to formatted tracks.

- 'Verify Data' can be used to verify DOS and non DOS tracks, however the 'Data Length' gadget may be needed with some non DOS tracks if bad verifies are given on many tracks with the error at approximately the same offset.

- When Verify Data is used with multiple targets and tracks are retried or could not be verified, on completion of the backup a window will be opened with error grids for all four target drives displaying where the errors occurred. The grids will also be displayed if one or more tracks are retried when writing to one target drive. Any tracks which had to be retried to verify successfully display the code 'R'. If the source is a non DOS disk, source drive rereads are also displayed in the corresponding target grid.

- 'Verify Count' is the maximum number of retries for verifying written data, non DOS rereads, 'Retry Errors', bad track reads and 'Disk Compare' reads.

- 'Retry Errors' are the error numbers to be reread if encountered. The default retry errors are '1', '4', '5' and '9' as these are normal common DOS errors.

- 'Read Length' is the length of the last track read in words (two bytes).

- 'Drive Speed' is the length of data, in words, that can be written to each track on the disk in the target drive.

- 'Data Length' is the length in words to verify and the data length to transfer to the write buffer for non DOS tracks. '0000' equals full track length.

- 'Say Message' is for turning the speaking of narrated messages On and Off. The Narrator.device must be in the 'Devs' directory and the Translator.library in the 'Libs' directory of the current boot drive, and the Disable loading of speech gadget in the Preferences window turned off for speech to work.

- If you require more free memory or do not want Speech, select the speech disable gadget in the Preferences window and save it with 'Save Defaults'. This speeds up the loading of PowerCopy and frees up to 76300 bytes of memory.

- 'Speed Adjust' prompts for drive speed adjustment if the first read track length exceeds or equals the initial pause length set in the Preferences window or if following track lengths vary by more than twenty words. 'Speed Adjust' On has priority over 'Hardware Device' Auto for long tracks only.

- The status code 'L' for long track, will only be displayed with 'Speed Adjust' Off as 'Speed Adjust' On will stop and prompt for drive speed adjustment.

- 'Format Method' allows selection of Quick format so the Format Target option when selected will write a new boot block and an empty root directory instead of formatting the selected track range. Options are also available for Fast file system, International mode and Directory caching which are applicable to the correct KickStart versions only and apply to the 'Install boot' function.

- 'Length Values' sets 'Read Length' and 'Drive Speed' values to hex or decimal.

- The 'ABORT' gadget will abort the current disk operation. The 'Esc' key and the 'Close Window Gadget' can also be used to abort disk and other functions.

- 'FORMAT' creates a bootable DOS disk to store files to, using the name entered in the 'Format Name' string gadget. 'Empty' is used if no name is entered. Disks can be formatted Quick and using Fast file system, International mode and Directory caching. These options are applicable to the correct KickStart versions only and are selected from the 'Format method' menu option.

- 'CHECK' reads the source disk to check for errors or create a disk parameter.

- Copy 'SELECTed' is used for Copying, Checking, Formatting, Comparing, Erasing, Analyzing, BitMap copy and Recopying selected tracks or errors. Select tracks by clicking in the error grids with either mouse button or press keys for corresponding errors. Use the numeric keypad for errors '2' and '3'. Analyze selected auto sets correct index requirements in the generated parameter.

- Disk 'COMPARE' compares the disks in the selected source and target drives.

- 'Erase Targets' erases the target disk or disks if using backup mode Multiple.

- Disk 'INFO' displays free blocks per track, total blocks free and disk name.

- 'RENAME' names the target drive disk with the name in the 'Format Name' string gadget. If no name is entered the default name of 'Empty' will be used.

- 'INSTALL' writes a standard DOS bootblock to the disk in the target drive. The 'Format method' menu option can be used to install disks with Fast file system, International mode and Directory caching. These format and install options are only applicable to the correct KickStart versions.

- 'ANALYZE' displays a track density graph for the last track read. Click the right mouse button to access the error grids and analyze options, then mouse click in the error grids to graph another track. Press the 'A' key or click the right mouse button again for disk buffer analysis and backup suggestions.

• Analyze 'BUFFERS' displays the PowerCopy disk buffers. Keys 'R'ead, 'W'rite, 'F'ix and 'S'ync set the corresponding buffer start. Tab toggles edit on and off, 'H' toggles between ASCII and Hex, Up and Down arrows scroll a full page, Left arrow backs up half a page and Right arrow scrolls one line. The '1/End' key displays the end of read track data and '+' and '-' shift the data in the write buffer left or right one bit. 'A'nalysis key gives a buffer analysis.

• 'MOVE' transfers the last loaded disk parameter file to the edit/save buffer to display or make further alterations to an existing disk parameter file.

• 'EDIT' or create a disk parameter. Keys used are 'S' to display SyncWords from a 'SyncScan' copy, Up and Down arrows or the slide gadget to position the edit pointer to the desired track and side. '0' to '7' change the top line of the display to the corresponding track number * 10. Left and Right arrow keys move the cursor left or right to the desired field to edit. 'Spacebar' duplicates the parameters for the last track edited or 'Tab' duplicates the last track edited, excluding the SyncWord. 'Y' and 'N' are for 'On' and 'Off' fields. 'O', 'N' and 'S' for 'Off', 'NIB'ble and 'SEC'tor in the Nibble field. 'D' and 'N' are for 'DOS' and 'NON' DOS. '2' and '4' are for bit cell timing. 'M' and 'G' are for 'MFM' or 'GCR' and '0, 1, 2 and 5' are for '000, 140, 280 and 560' nano seconds write PreComp. The Sync and Length fields have different meanings for DOS tracks. The Sync field is for the Gap fill value and the Length field is for the number of words to fill the Gap with.

• 'DELETE' Parameter opens the File Requester to delete one or more parameter or other files. Hold a Shift key down to select multiple files.

• 'LOAD' Parameter opens the File Requester to load a parameter file. Backup mode parameter and end track 81 are auto selected after loading a parameter. The default path of 'Parameters:' can be changed from the Preferences window.

• 'SAVE' Parameter opens the File Requester to save the created, edited or generated parameter in the edit/save buffer to the selected directory.

• 'Edit SyncWords' allows editing of the SyncWord table which contains the SyncWords PowerCopy scans for if the standard \$4489 SyncWord is not found.

• 'Load SyncWords' opens the File Requester to load a previously saved SyncWord file into the SyncWord table. With some expertise, the user can create different SyncWord files for various applications and load them when required.

• 'Save SyncWords' opens the File Requester to save the current SyncWord table to disk. The SyncWord table must be saved using the path 'SYS:S' and the file name 'PowerCopy.SyncWords' if it is to be auto loaded when PowerCopy loads.

• 'Test SyncWords' enables and disables auto testing for valid SyncWords when PowerCopy is scanning for other SyncWords. The need to disable auto testing for valid SyncWords should be very uncommon, but can be tried if necessary.

• 'Exit PowerCopy' exits PowerCopy. The 'Close Window Gadget' can also be used.

• 'Lower Side', 'Upper Side' and 'Both Sides' select the disk sides to use.

• 'Start Side' selects the disk side to start a disk operation from.

• The labels 'Side 0' and 'Side 1' in the error grids are gadgets. Click the left mouse button on the gadgets once to set the corresponding disk side or double click to set 'Disk Side' both and 'Start Side' to the side selected.

• 'About PowerCopy' gives current version, authors name, distributor etc.

• Status 'ERRORS' and codes displays all status codes and track errors.

• Resident 'SLEEP' closes the PowerCopy screen, leaving PowerCopy resident in memory. Press both mouse buttons simultaneously to return to PowerCopy. The 'Delete' key can also be used for this function.

• 'Write RAM Data' writes memory to the selected track range starting from the address entered in the 'Mem Address' string gadget.

• 'READ' one track reads the selected start track and side into the disk read and write buffers. Use 'BUFFERS' to display or analyze the read track.

• 'WRITE' one track writes the current disk write buffer contents to the currently selected start track and side. The disk write buffer will contain the data from the last track read or data from the last track written if the previous operation was Format, Erase, Write memory or write KickStart.

• 'Write KickStart' writes the resident ROM based KickStart to disk in the format required for an Amiga 1000. Allows for all versions of KickStart.

• 'Multiple Speeds' displays the drive speed of selected target or target drives if backup mode Multiple is selected. Hex and decimal byte and word lengths, R.P.M. and rotation time are displayed. Available also from 'DRIVES' gadget.

• 'Reselect Drives' retests and enables use of floppy drives turned on after PowerCopy has been loaded. Available also from the 'DRIVES' gadget.

• 'DRIVES' overlays the main gadgets with gadgets to select source, target, multiple targets, copy modes 'Quick' and 'Multiple' and perform drive tests.

• 'DEVICE' overlays the main gadgets with gadgets to select source, target, multiple targets, Clear RAM, delete current path device track files, make or delete device directory and select the device path using the File Requester.

• 'ASSIGN' function, when selected will assign the next gadget or menu option selected to the numeric Enter key.

• 'Load Defaults' opens the File Requester to load a PowerCopy config file.

• 'Save Defaults' opens the File Requester to save the PowerCopy configuration. For auto config file loading when PowerCopy loads use SYS:s/PowerCopy.config.

• 'PREFS' opens a window for editing PowerCopy default preferences.

• 'DEFAULT Prefs' resets the main window default PowerCopy configuration. The Backspace key resets the defaults for the Preferences window. Selecting defaults while holding a Shift key will select the last user loaded defaults.

• PowerCopy will load with DEFAULTS set if the PowerCopy.config file is deleted.

• 'Color Palette' opens a Palette Requester to customize PowerCopy colors.

• 'Color Stripes' changes the PowerCopy screen background color to stripes.

• 'Normal Colors' changes the PowerCopy screen background color to one color.

• Options marked in **Boldface** in this document are also selectable from the main gadgets in the lower half of the main window, as well as pull down menus.

Helpful Hints For Backing Up Software

A common reason for a backup failure is the occurrence of a '2' or '3' error which can be a bad read because of a partially erased or unwritten track. The errors '2' and '3' are most commonly a totally blank track but could be an uncommon protection. These erased areas are usually there on purpose to make it harder to backup the original, as other software I have seen give no indication when this type of bad read occurs. Unwritten areas of disk media will read back differently every time, so during a backup if there are erased areas on any tracks your Amiga may find a false SyncWord in the erased area instead of the correct SyncWord at the start of the disk data. This will result in an error '3' or an error '2' for a non standard SyncWord. The 'Verify Count' can be increased to retry reading these tracks more times but will unnecessarily slow down a backup with many blank tracks. Using 'Index Copy' On sometimes helps with bad track reads. After a backup is complete 'Copy Selected' could be used to select these tracks and recopy them. If you cannot eliminate these errors the tracks are probably completely blank. Use 'Analyze Track' to confirm if a track is completely or partially blank. If the entire graph line is very jagged across the screen then the track is completely blank. If some of the graph line is gently wavering and the rest very jagged then the jagged part of the graph line is the portion of the track that is unwritten or erased. I have encountered two programs that had all DOS tracks with the exception of one that gave an error '3'. This track had an uncommon protection which could not be reliably auto detected and required 'Index Copy' On and 'Hard Device' On to backup the track. Analyzing the track showed one sharp sawtooth about two thirds the way along the graph line.

PowerCopy can verify non DOS tracks as well as DOS tracks using 'Verify Data' On to guarantee data integrity, however with non DOS tracks it is not possible to reliably auto detect how much of the track length is actual data and how much is empty gap. If the gap on the disk is legal MFM format, verifying the entire track length will not be a problem, but if the gap is erased it will read back differently every time giving a bad verify. If 'Verify Data' is On, the 'Data Length' gadget can be used to stop the verify at the end of the program data, preventing bad verifies from erased areas in the gap or illegal MFM bit patterns probably from where the disk data overlapped when written. An example of when to use this would be if software being backed up was fairly consistently giving an error message at the word length of say \$1726, \$1727, \$1725 and staying in that area, you would stop the backup, edit the 'Data Length' gadget to \$1725, ie: the minimum length in error, and restart the backup. PowerCopy will not verify past the 'Data Length' and will not transfer anything after this length to the target disk. This will also result in a clean gap on the target disk, making this backup easier to backup a second time, probably without having to use the 'Data Length' gadget.

When backing up software with very long data tracks using the Hardware Device, the backup can be unreliable or fail completely on some disk drives. The problem is emphasized on the higher, inner tracks which are smaller and data therefore more dense. Excellent results have been achieved eliminating this problem by using high density disks, however unless using the Hardware Device, it is advisable not to use high density disks as some brands are less reliable than double density disks when used in double density 880k drives. If backing up disks with lots of long data tracks and some normal length tracks onto high density disks, use 'Hard Device' On as PowerCopy only uses the Hardware when necessary. Note: If using a high density disk in a high density drive, the high density notch opposite the write protect tab needs to be covered.

If 'Fix Errors' is On, PowerCopy will always bypass using the Hardware Device if a track has an error. The message 'Hardware error fix not possible, bypassed' will be given if this occurs. If the track bypassed was protection, and would have otherwise used the Hardware Device, the backup will fail.

Some protections requiring the Hardware Device need the source and target drive indexes to be aligned. The message 'Left mouse: Abort index alignment, Right: Abort copy' will be displayed and an alignment graph window opened with these protections. If the displayed difference in drive speeds is close to 00000 with the alignment graph hovering in the one place, abort and adjust the 'Index align motor pulse'. See Hardware Copy and Index align motor pulse for more information. A very common protection requiring Index Alignment is auto detected by PowerCopy in its default mode and displays an error '3' on track 0, side 1. If this protection is used it will be the main or only protection and needs to be backed up correctly. If you abort the Index Alignment with this protection the backup will probably fail. Some software require track 0, side 1 to be separately Index Synced with 'Hard Device' On.

A disk backup will fail if 'Index Copy' On was required but not used. If in doubt use Index Copy On or Index Copy Auto which is about 98 percent accurate.

A disk backup will also fail if protection is missed on tracks 80 and 81. Use the 'Analyze Track' function to see if they are blank or set the end track to 81. If the backup still fails use 'Index Copy' On, 'Verify Data' On and try Index Sync, Power Nibble, Sector Nibble and SyncScan in that order.

Understanding Data Storage And Disk Protections

When a disk track is written the program data does not cover the full circumference of the track. There is an empty gap between where the program data starts and finishes. This unused area is called the 'Gap' and has to be present to allow for drive motor speed variations, and to ensure that program data does not overlap itself when written. Data is written to a disk at a fixed rate, so if a disk drive motor is slower than normal, each disk rotation will be longer giving time to write more data making it more dense. If a drive motor is faster than normal, each disk rotation is faster giving less time to write data resulting in a shorter track length and less dense data.

One common protection, called a long track, involves slowing down the drive motor speed when a track is written so it contains extra data. When copying long tracks it will not be possible to get all the data onto the target disk, unless your target drive is slowed down by the same amount as the drive the original tracks were written on. If you have a drive with motor speed control or the Hardware Power Device fitted, PowerCopy can backup these tracks. The Power Device will be used automatically with defaults set, or if 'Speed Adjust' is On PowerCopy will prompt you to adjust your target drive speed to the 'read length' given in the message prompt. Most single long track protection schemes are normally on track 0, side 1 and often contain nothing of value. Other long track schemes involve all of the data tracks being long, and may hold more program data than a track written with normal motor speed.

When reading a track, the drive hardware needs to know where the program data starts on a track. This is done using a special word called a SyncWord which does not occur in normal disk data. When a read using SyncWords is started, the drive hardware monitors the data coming from the disk media and commences reading the data into memory when the requested SyncWord is found. The SyncWord used with DOS tracks, IBM disks and most protected disks is \$4489.

Another protection involves a SyncWord other than the standard \$4489 being used on one or more tracks. This is where other backup software fail, as most only allow for the standard \$4489 SyncWord. PowerCopy uses an internal list of SyncWords, or if present, a file called 'PowerCopy.SyncWords' which can be changed using 'Edit SyncWords'. PowerCopy will automatically scan using these SyncWords to find the SyncWord being used. One protection has the same SyncWord occurring at different positions on the track, and it is necessary to read the track on the first SyncWord after the gap. These tracks are written and read after waiting for the index pulse and will therefore need to be backed

up using 'Index Copy' On. DOS tracks have eleven separate blocks of data, also called sectors, which are separated by \$4489 SyncWords. This speeds up reading as less than one eleventh of the track has to be scanned to find a SyncWord. An unprotected DOS track does not need to use Index Copy On to find the first SyncWord after the gap, as the sectors are of a known size and are numbered so they can be sorted after the track has been read.

Other protections using SyncWords which would need backup mode nibble, unless the correct SyncWord is known, try to fool backup software by placing a different SyncWord directly before a standard \$4489 SyncWord, or reversing bytes on a pair of standard SyncWords. For example, if a pair of \$8944 SyncWords are used on a track instead of the standard \$4489, the track would be read with the \$4489 SyncWord which can be found behind the \$89 byte at the start of the SyncWord pair. As a result the \$89 byte of the \$89448944 would be missed. Below are four examples of the starting area of non DOS tracks. Example 1) is a common non DOS track, example 2) is a non DOS track with an \$a245 SyncWord placed before the standard \$4489 SyncWord, example 3) is a non DOS track using \$8944 for the track SyncWord instead of the standard \$4489 and example 4) is the same track as example 3) but shows the result of reading the track using the standard \$4489 SyncWord instead of the required \$8944. Note that the first \$89 byte has been lost. All these examples use SyncWord pairs, but note a large percentage of non DOS software use only a single SyncWord.

Examples:

	End of Disk Gap			SyncWords		Track Data		
1)	AAAAA	AAAAA	AAAAA	44894489	AAA4452A	52A95454	AA944455	etc
				Track read should start here				
2)	AAAAA	AAAAA	AAAAA245	44894489	AA494545	2A944545	294A9294	etc
				Track read should start here				
				Track read would start here using \$4489 SyncWord				
3)	AAAAA	AAAAA	AAAAA	89448944	AA454A91	4AA44AA4	51294AA4	etc
				Track read should start here				
4)	AAAAA	AAAAA	AAAAA	448944AA	454A914A	A44AA451	294AA4AA	etc
	Nibble copy will start here on all tracks ensuring correct SyncWords							

A less common protection is where there is no used SyncWord on a track and the data is read and was written using the index pulse. Backup mode 'Index Sync' will be required to duplicate these tracks. Selecting Index Sync disables use of SyncWords and copies from one index pulse to the next, which is exactly one disk rotation. Backup mode 'Index Sync' will fail most times on DOS tracks unless they were written using the index pulse, as the backup will probably start and or stop in sector data instead of the gap, damaging the data in that sector. Note: DOS tracks could be written using Index Sync as protection and would therefore need backup mode 'Index Sync' to back them up correctly.

Some protected software use a different SyncWord on every track and it is possible some of these SyncWords may not have yet been added to the SyncWord table. Most software however, seems to be written with index copy on in the factory, and as a result backup mode 'Index Sync' backs up these disks without having to know what SyncWords were used on each track. If the boot track or other DOS tracks on the disk being backed up were not written with index copy on, they may have to be copied separately without backup mode Index Sync. The Copy Selected function is ideal to copy these DOS tracks separately.

Project Options

START Main ENTER key

Start disk backup will backup data from the source disk to the target disk or target disks if backup mode Multiple is selected. The numeric Enter key, if not assigned and the main Enter key can also be used. On selection of START, the edit parameter buffer is cleared and a new disk parameter is generated as each track is read. If START is used for creating a parameter, it is best used in conjunction with Index Copy Auto selected, as this will automatically use the correct Index Copy setting for each track read with at least 98% accuracy. If START is selected from the 'SELECT' function, clearing of the edit disk parameter buffer is bypassed, as functions used with Copy Selected insert into parameters and target drive RAM without clearing other tracks.

ABORT

Aborts the current disk operation. The 'ESC' key and the 'Close Window Gadget' can also be used to abort disk and other operations.

FORMAT Format Targets

Format Target will format the target disk or target disks if using backup mode Multiple, naming the disk or disks with the name entered in the 'Format Name' string gadget or using the default name of 'Empty' if no name is entered. If the format started from track 0 and the 'Install bootblock with format' option in the Preferences window is enabled, a bootblock will be installed making the disk bootable. Disks can be formatted using Fast file system, International mode and Directory caching. These options are applicable to the correct KickStart versions only and can be selected from the 'Format method' menu option. A Quick format which formats the boot and root blocks only is also available from the 'Format method' submenu, but should only be used with a previously formatted disk. Verify Data can be used to verify formatting.

CHECK Check Source

Check Source reads the source disk, displaying errors or status codes in the error grids. Displayed errors can be normal if non DOS disk protection, or unwanted errors due to bad disk media or a bad track write. Check Source will also generate a disk parameter and if used for this purpose is best used in conjunction with Index Copy Auto selected, as this will automatically use the correct Index Copy setting for each track read with at least 98% accuracy. On selection of CHECK, the edit parameter buffer is cleared and a new disk parameter is generated, as each track is read. If Check source is selected from the 'SELECT' function, clearing of the edit disk parameter buffer is bypassed, as functions used with Copy Selected insert into parameters and target drive RAM without clearing other tracks.

SELECT Copy Selected

Copy Selected can be used to recopy tracks after completing a backup, eg; errors '2' and '3', which are blank tracks or bad reads probably due to partially erased tracks. Select tracks by clicking in the error grids or use corresponding keys for errors. Keys '2' and '3' on the numeric keypad select errors '2' and '3'. Reselecting a marked track unmarks it and redisplay the original error. After selecting tracks to recopy, commence with 'START' or either Enter key. Copy Selected will insert into generated parameters and target drive RAM or DEV without clearing other tracks and can also be used to Check, Format, Compare, Erase or Analyze selected tracks by selecting the corresponding gadget to start the operation. The 'B' key can also be used for a DOS disk BitMap copy which will copy tracks with file and directory data only. If using the BitMap function to copy to another floppy, it is best if the target disk has been previously formatted. If using the BitMap function to conserve space when copying to target drive DEV, 'Fix Errors' Auto can be used to convert the blank source tracks back to formatted target tracks. When copying DEV back to floppy the unused formatted tracks which were not copied will be converted back to formatted tracks. As Copy Selected inserts into target drive RAM or DEV without clearing other tracks you may want to use Clear RAM or Clear DEV from the 'DEVICE' gadget before using the BitMap copy. Note: Analyze selected or 'Index Copy' Auto will create a parameter automatically setting correct index requirements with at least 98% accuracy.

COMPARE Compare Disks

Compares the disks in the source and target drives. Refer to 'Verify Data' as information is applicable, except there is no track write or reread on non DOS tracks. Turning 'Fix Errors' On with disk compare will cause bad verifies.

ERASE Erase Targets

Erase Targets erases the disk in the target drive or target drives if using backup mode Multiple. Erase Targets writes zeros to the disk, which will restore the disk to an unwritten (unformatted) state. Note: The default value of zero which is used to erase the selected target drives can be changed to any word value. See also Preferences option 'Fill Word for Track Erase'.

INFO DOS Disk Info

Disk Info displays the name of the disk in the source drive, total free blocks and number of blocks free per track in the error grids, in hex. NOTE: 'A' hex = 10 decimal, 'B' hex = 11 decimal. One block = 512 bytes. There are 11 blocks per track, 80 tracks per side, 2 disk sides * 80 tracks = 160 total tracks. 160 tracks * 11 blocks = 1760 total blocks. 1760 blocks * 512 bytes = 901120 total bytes. 901120 bytes / 1024 (1k) = 880k bytes per disk.

RENAME *Name DOS Disk*

Renames the disk in the target drive with the name in the 'Format Name' string gadget. If no name is entered, the default name of 'Empty' is used.

INSTALL *Install Boot*

Install Boot writes a standard version 2.0 KickStart DOS boot block to the target disk. The format option will also automatically install a bootblock if enabled from the Prefs window. The 'Format method' menu option can be used to select the Fast file system, International mode and Directory caching. These format and install options are applicable only to the correct KickStart versions.

NOTE: **DO NOT** install a bootblock onto the original PowerCopy disk.

BUFFERS *Analyze Buffers*

Analyze Buffers displays the buffers used by PowerCopy in ASCII or Hex. The functions available from this window can be selected by key or the gadget line at the base of the window. These include an analyze buffer function which gives a description of the track read, a suggestion on how to back the track up and what special hardware, if any is required. If an error occurred when using 'Verify Data' On, a message for the last track in error, showing the word and byte offset in error will be displayed in the buffer analysis window.

The Read buffer contains the MFM data read from disk, except for Index Synced tracks which are read directly into the disk Write buffer. The Write buffer contains the sorted sectors if the track was standard DOS, the track length contents of the Read buffer or the length specified with the 'Data Length' gadget, if other than \$0000. The SyncWord buffer contains the SyncWords which are stored from the result of a 'SyncScan' backup. The Fix buffer holds the contents of MFM data converted back to normal data when Fix Errors is used on DOS tracks and as a temporary buffer when using Write Memory to disk, Disk Info, Rename Disk and Install Boot. To display the contents of a standard DOS or damaged DOS track as normal data, that is with the clock bits removed, read the track with 'Fix Errors' On and display the data in the Fix buffer. Keys 'R'ead, 'W'rite, 'F'ix and 'S'ync set the display to the start address for the corresponding buffer. The 'Tab' key toggles buffer editing on and off, 'H' swaps between ASCII and Hex, 'A' displays the buffer analysis, Up and Down arrows scroll the display a full page, Left arrow backs up Half a page and the Right arrow scrolls one line. The '1/End' key moves the display to the end of the read track data and the plus and minus keys shift the data in the Write buffer left or right one bit at a time. The bit shift function can be used on an 'IndexSynced' track to help identify a new SyncWord used with that track. See also Track Analysis and Verify Data.

Each long word of data, when converted to the MFM format will be stored as two long words of MFM raw data. One long word contains the original long word even data bits plus clock bits and the other long word contains the original long word odd data bits plus clock bits. Data bits are always in the even bit positions while the clock bits, which can be binary zeros or ones, are in the odd bit positions of the MFM data. The decision of whether a clock bit is to be a 0 or 1 is determined by the neighboring data bits. For a clock bit to be a binary 1, the data bits on both sides of the clock bit must be 0, otherwise the clock bit will be 0. As a result there is never more than one binary 1 digit or three binary 0 digits in a row. Legal MFM hex numbers are therefore 1,2,4,5,8,9 and A and Illegal MFM hex numbers are 0,3,6,7,B,C,D,E and F.

Examples:

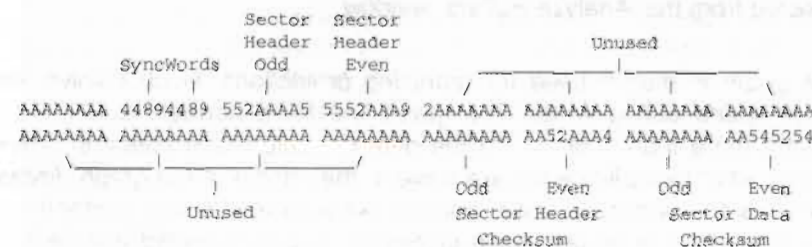
	Hex Long Word	Thirty Two Bit Binary Equivalent
Original	\$00000000	%00000000000000000000000000000000
MFM Odd Bits	\$AAAAAAAA	%10101010101010101010101010101010
MFM Even Bits	\$AAAAAAAA	%10101010101010101010101010101010
Original	\$FFFFFFF	%11111111111111111111111111111111
MFM Odd Bits	\$55555555	%01010101010101010101010101010101
MFM Even Bits	\$55555555	%01010101010101010101010101010101
Original	\$12345678	%00010010001101000101011001111000
MFM Odd Bits	\$12945452	%00010010100101000101010001010010
MFM Even Bits	\$2912A914	%00101001000100101010100100010100

Table of HEX Binary Values

0=0000 1=0001 2=0011 3=0011 4=0100 5=0101 6=0110 7=0111
8=1000 9=1001 A=1010 B=1011 C=1100 D=1101 E=1110 F=1111

Format of a Standard DOS track

For a better understanding of MFM data and what is displayed in the disk buffers for a DOS track, included here is a description of an Amiga DOS track and a diagram showing what the start of each Amiga DOS sector looks like.



Amiga DOS Track Description:

The first long word of \$AAAAAAA is used for sorting sectors after a track is read. The second long word has the two \$4489 sector SyncWords, the third contains the odd data bits of the sector header and the fourth contains the even data bits of the sector header. The next eight long words are unused, the following two are the sector header checksum and the last two are the checksum for the sector data which directly follows the sector checksum. The sector data consists of two 512 byte blocks, the first containing the odd data bits of the sector data and the second the even data bits of the sector data. The above pattern is duplicated eleven times on each track as there are eleven blocks per track. The two long words making up the sector header, when clock bits are removed have the format \$FFTTSSGG where \$FF indicates this is a valid DOS sector header, TT is the track number for the current track read, SS is the sector number and GG is the count of sectors to the gap. In the example above (\$552AAA5 \$552AAA9) with clock bits removed is \$FF50000B of which \$FF indicates a valid sector ID, track number \$50, sector zero and eleven sectors to the gap on this track. The track numbering system counts from side to side, so that \$50 which is 80 decimal is track 40, side 0. Non DOS tracks can be set up in many ways but most have no sectors or sector headers and normally just start with two SyncWords, then long words containing all the odd and even bits of the track data. The chance therefore of having \$55 on the first byte of the first two long words, which on a DOS track would be the sector ID, is remote. Most non DOS tracks therefore result in PowerCopy displaying an error '3' in the error grids, ie: Bad Sector ID, Probably Non DOS.

ANALYZE *Track Analysis*

Analyze reads the selected start track and side and displays a graph of the track density and length, which are directly proportional, ie: the data on a long track will be more dense than a normal length track. Click the right mouse button to access the error grids and analyze options, then mouse click in the error grids to graph another track. Press the 'A' key or click the right mouse button again for a buffer analysis report and backup suggestions. The buffer analysis can also be selected from the 'Analyze Buffers' window.

The graph is mainly used for detecting protections which involve varying the motor speed during write. The graph line for a normal track will usually not deviate more than + or - 1 on the density scale. One common protection will display what looks like a square wave in the middle of the graph deviating up to + and - 3 on the density scale, another like a narrow, sharp sawtooth wave of up to + and - 2. The square wave protection is auto detected and backed up with the Hardware Power Device, others may need 'Hard Device' On for the tracks suspected as protection. Anything deviating outside the normal could be

protection if there are no erased areas on the track. A blank track shows a very jagged line varying up to + and - 4 on the density scale. As blank tracks have no data and illegal MFM bit patterns the disk drive will pick up random data each read giving varying track lengths and density on every read. To see an example of a blank track, erase a track with unwanted data using 'Erase Target' and analyze it. A partially erased track will show a deviation in the erased area and could be present with another protection. The Buffer Analysis should state if the track is partially blank. Many of these protections require 'Index Sync' and 'Hard Device' On to correctly back them up. The square wave protection is currently on track 0, side 1 and normally displays an error '3'. The sawtooth wave protection is rare but can be on any track, normally among DOS tracks producing an error '3'. This error is normally a blank track found commonly on non DOS disks. All varying density protections require the Hardware Power Device. See also Copy Selected.

MOVE *Move Parameter*

Move transfers the last loaded disk parameter file to the edit/save parameter buffer to display or make further alterations to an existing parameter file.

EDIT *Edit Parameter*

Edit opens a window to display and manually create or edit a parameter. See 'Parameter Copy' for full information on editing and creating parameters.

DELETE *Del Parameter*

Delete parameter opens the File Requester to delete one or more parameter or other files. Hold a Shift key down to select multiple files to delete.

LOAD *Load Parameter*

Load Parameter opens the File Requester to allow loading a parameter file into the parameter load buffer, for a parameter backup, or to move to the edit/save buffer for further editing. The default parameter path of 'Parameters:' can be changed from the Preferences window, for example if PowerCopy is installed onto harddrive DH0:, 'DH0:Parameters' should be entered in the Parameter path string gadget in the Preferences window. Parameter file names ending in -1, -2, -intro etc. donate the programs disk name or number the parameter belongs to. If there is only one parameter file for a multiple disk program, then that parameter file is for all the disks belonging to that software. The Hide and Show string gadgets on the File Requester can be used to selectively hide or show file names using wild card characters, eg; 'g#?' entered in the Show box will display files starting with 'g' only, while 'sp#?' in the Hide box will not display any files starting with 'sp'. Backup mode Parameter and end track 81 are automatically selected after loading a parameter file.

SAVE *Save Parameter*

Save parameter opens the File Requester to save the created, edited or generated parameter in the edit/save buffer to the selected directory.

Edit SyncWords

The SyncWord table used to scan for other SyncWords when the standard \$4489 SyncWord is not found can be changed or SyncWords can be added and deleted. Press the Spacebar to insert a new SyncWord before the table end or the Delete key to remove a SyncWord from the list. Note that any SyncWords behind a \$0000 entry will not be recognized ie; \$0000 terminates the SyncWord table. Entering \$0000 behind the first \$4489 SyncWord for example would disable SyncWord scanning, causing PowerCopy to IndexSync copy any tracks without the standard \$4489 SyncWord. As \$4489 is the standard SyncWord used with most disks it should always be the first entry in the table if it is to be used.

Load SyncWords

Load SyncWords opens the File Requester to select a SyncWord file to load into the SyncWord table. With some expertise the user can create and save different SyncWord files for various applications and load them when required. The default file name of 'PowerCopy.SyncWords' should be in the 'S' directory of the boot drive if it is to be automatically loaded when PowerCopy loads.

Save SyncWords

Save SyncWords opens the File Requester to save the current SyncWord table to disk. The SyncWord table can be saved using any file name and path, but the default file name of 'PowerCopy.SyncWords' should be used and saved to the 'S' directory of the boot drive if it is to be auto loaded when PowerCopy loads. If Edit SyncWords has been used to edit and experiment with the SyncWord table and is accidentally saved with the default name of 'PowerCopy.SyncWords', delete that file and PowerCopy will load with the default SyncWord table.

Test SyncWords

Test SyncWords enables and disables auto testing for valid SyncWords when PowerCopy scans for other SyncWords. If the standard \$4489 SyncWord cannot be found on a track, the SyncWords from the SyncWord table will be used to try to find a SyncWord the track can be read with. When auto testing is enabled (default) the data after the SyncWord will be tested for correct clock and data bit positions to try and establish if the SyncWord is valid, and if not PowerCopy will continue trying other SyncWords from the table. If desired valid SyncWord testing can be disabled when using backup mode SyncScan, so all potential SyncWords can be viewed from the SyncWord window which is available by pressing the 'S' key from the edit parameters window. On rare occasions, valid SyncWord testing may need to be disabled if PowerCopy scans for other SyncWords. Using backup mode Parameter overrides SyncWord testing.

Exit PowerCopy

Select the menu option 'Exit PowerCopy' or use the 'Close Window Gadget' when not in any function to exit PowerCopy. See also Resident SLEEP.

Available Backup Modes

Quick Copy

This default backup mode is fast, very powerful and will backup most software with 'Index Copy' On or Off as required. It will rarely be necessary to change from this mode. If defaults are set the Hardware Power Device is used for long tracks and most varying density protections automatically.

QuickPlus Gap

Backup mode 'QuickPlus' is identical to 'Quick' except the gap on DOS tracks is copied also. Data in the gap was used occasionally with old protections.

Multiple

Backup mode 'Multiple' is used to write to several target drives at once. Multiple is intended for DOS tracks, but will backup some protected software without hardware or index requirements. You can also Format, Erase, Write tracks, Memory and KickStart or do Drive Speed tests on all available targets. If there is sufficient memory or DEvIce space you can also copy a disk to target drive RAM or DEV and then copy source drive RAM or DEV to all available targets. Backup mode 'Multiple' also has a very fast mode to backup DOS disks in 38 to 65 seconds using 'Hard Device' On, but all targets selected must be behind the Hardware Device or the normal read/write routines will be used and the backup will be slower. This fast mode works by transferring data directly through the Hardware Device while reading the track and the speed of the backup is determined by the position of the data on each track. Note that tracks backed up through any Hardware Device are never as reliable as tracks which are backed up normally, however high density disks used with the Hardware Device only, improves reliability greatly. See Hardware Copy for more information about using high density disks. Multiple targets are selected by using the gadgets labeled 'Multiples', 'ALL' (all available targets), 'AES' (All drives Except Source), 'DRIVES' and 'DEVICE' or using the keys 0,1,2 and 3. Selecting the gadget labeled 'Multiples' while depressing a Shift key is a quick way of setting the options required for the fast backup mode using the Hardware Device. Selecting the gadgets labeled 'AES' and 'ALL' while holding a Shift key down also selects backup mode Multiple.

Index Sync

Backup mode 'Index Sync' disables the use of SyncWords and copies from one index pulse to the next, exactly one disk rotation. PowerCopy will use 'Index Sync' copy automatically if no known SyncWord is found, but may sometimes be needed to backup a disk. IBM disks are formatted using the index pulse, so backup mode 'Index Sync' will backup nearly all protected IBM software.

Sector Nibble

Sector Nibble is similar to backup mode 'Power Nibble', except it searches for the largest gap on the disk and starts the backup prior to the SyncWords at the end of the largest gap found. This backup mode will backup AMAX software, DOS tracks and other software that have some form of sector format.

Power Nibble

With some protected software a different SyncWord is placed before the standard \$4489 SyncWord, so without Nibble the track would be backed up using the standard SyncWord and miss the required SyncWord. Also due to the way disk data is stored, some SyncWords can be confused with others. Nibble looks for the first SyncWord it can read the track with, then backs up the entire source track from a few words before the found SyncWord. Nibble also takes the gap on DOS tracks, ie: it will do the equivalent of 'QuickPlus' and will also place the source data onto the target disk in the same position. When a track is read using SyncWords the Amiga disk hardware will drop and lose bits out of the data read if necessary to make other SyncWords on the track load into memory on word boundaries. Nibble reads each track without SyncWords as the lost data would cause the backup to fail with some protections. See also the paragraph with examples in 'Helpful Hints for Backing up Software'.

Parameter Copy

On completion of a disk backup, Check disk or Analyze selected operation, a parameter is generated of info used to backup each track. The options Format, Bit timing, MsbSync and Write PreComp will be set for MFM, which is the format the Amiga and IBM use and may never need to be touched. The most important options are the SyncWord, Length, Index Copy and whether DOS or NON DOS.

Note: Some parameters may need to be or would be best created by the author, for example software with new SyncWords. The 'BUFFER' function can be used to find new SyncWords on a track, but some degree of expertise is required. A large, growing selection of parameters is supplied with the PowerCopy disk, but the majority of these are supplied for convenience rather than necessity.

If using the function Analyze Selected, or 'Index Copy' Auto is selected, the Index Copy field for the parameter will automatically be set to On or Off with a high degree of accuracy (at least 98% accurate). Note: Analyze Selected inserts into the current generated parameter, without clearing the buffer.

Backing up software using different SyncWords would be an example of when to use a parameter. Normally such a backup would take up to 10 minutes, due to SyncWord scanning, so on completion you would save the generated parameter which when loaded and used should now take less than two minutes. Backup

mode 'Parameter' and end track 81 are auto selected after a parameter is loaded. If the generated parameter is used on another original with shorter track lengths, it would copy the full track, plus the track start again. As this would damage the backup this is prevented by stopping at the correct track length and displaying the message 'NOTE: Track length under data length'.

The 'Data Length' gadget can be used to shorten the generated track lengths to just above the program data length, eg; An average track length is \$18ce words, whereas the actual program data length is normally between \$1700 and \$1890 words (the eleven sectors on a DOS track have a data length of \$1760). The 'Data Length' gadget can be used to set the program data length in all backup modes, except 'Index Sync'. After testing that your parameter works, you can experiment decreasing the 'Data Length' value until the backup fails. The 'Data Length' ideally would be one to eight words above the actual data length. If you use a value other than zero in the 'Data Length' gadget, that length will also be used in the length field for the generated parameter.

If creating a parameter for an Amiga DOS track the Sync and Length fields have different meanings. The Sync field becomes the value to place in the gap and the Length field is for the number of words to place into the gap. Using the length \$7fff will fill the whole gap. Fill lengths of greater than \$7fff are reserved for special parameters. To fill the target gap with \$20 words of \$4444 you would enter 0020 in the Length field and 4444 in the Sync field. The normal values to use with unprotected DOS tracks are AAAA for the fill value, which is zero with clock bits inserted (required for the MFM format) and you would use a length of 0001, as the gap on DOS tracks are AAAA's anyway. Gap Fill is for DOS tracks only, so DOS must be entered in the type field.

Parameter backup can also do a Sector or Power Nibble on tracks by setting the nibble field to 'SEC' for 'Sector Nibble' or 'NIB' for 'Power Nibble'.

Parameters can be edited using Edit Parameters and the following keys. Up and Down arrows or the slide gadget position the edit pointer to the desired track and side. '0' to '7' will change the top line of the display to the corresponding track number * 10. Left and Right arrow keys move the cursor left or right to the desired field to edit. 'Spacebar' duplicates the parameters for the last track edited or 'Tab' duplicates the last track edited, excluding the SyncWord. 'Y' and 'N' are for 'On' and 'Off' fields. 'O', 'N' and 'S' for 'Off', 'NiB'ble and 'SEC'tor in the Nibble field. 'D' and 'N' are for 'DOS' and 'NON' DOS. '2' and '4' are for bit cell timing. 'M' and 'G' are for 'MFM' or 'GCR' and '0, 1, 2 and 5' are for '000, 140, 280 and 560' nano seconds write PreComp. PowerCopy uses 140ns write PreComp after track 40 and is recommended to be used with your own parameters also.

There are two parameter buffers, one for a loaded parameter used with a parameter backup and the other an edit/save parameter buffer which contains a created or generated parameter from a backup. The edit/save buffer is cleared by a disk backup or Checkdisk, except when using 'Copy Selected' which will only change the parameter for the selected tracks. If you wish to edit a parameter, load it and select 'Parameter Move' to move the parameter from the load buffer to the edit/save buffer where it can be edited and resaved.

If it is preferable not to save parameters to the original Parameter disk, you can backup the Parameters disk or format a new disk and use the File Requester to select the drive and directory to Save, Delete and Load your parameters. The default path of 'Parameters:' can be changed from the Preferences window, for example if PowerCopy is installed onto harddrive DH0:, 'DH0:Parameters' should be entered for the Parameter path in the Preferences window.

SyncWord Scan

SyncWord Scan will scan the selected tracks for all possible SyncWords and use the last SyncWord found, instead of the first, to backup the track. This sometimes overcomes the problem of a different SyncWord placed in front of the standard \$4489 SyncWord. See Power Nibble. If the backup works you can save and use the created parameter instead of Nibble backup. If the backup failed, you can try other SyncWords found on each track. Press the 'S' key from the Edit Parameters window to display the SyncWords found. The SyncWord buffer contents are held until the next disk operation using backup mode 'SyncScan'.

Copy Options

Hardware Copy

As an alternative to motor speed control, PowerCopy can use the Hardware Power Device to backup long tracks. It is also needed to backup a protection that cannot be duplicated with a disk drive motor speed control. This involves precisely varying the motor speed up and down by specific amounts during the writing of a track. The Hardware Power Device transfers data directly from the source drive to the target drive, bypassing the normal internal disk hardware completely. As data is transferred direct, the density of the data on the source disk will be duplicated onto the target disk. Any drive after the Power Device can be a target, but to use an internal drive as a target the Power Device should be disabled by selecting 'Hard Device' Off.

When backing up software with very long data tracks using the Hardware Device, the backup can be unreliable or fail completely on some disk drives. The problem is emphasized on the higher, inner tracks which are smaller and data therefore more dense. Excellent results have been achieved eliminating this problem by using high density disks, however unless using the Hardware Device, it is advisable not to use high density disks as some brands are less reliable than double density disks when used in double density 880k drives. If backing up disks with lots of long data tracks and some normal length tracks onto high density disks, use 'Hard Device' On as PowerCopy only uses the Hardware when necessary. Note: If using a high density disk in a high density drive, the high density notch opposite the write protect tab needs to be covered.

For reliability and accuracy drive speed analysis is done at the start of a backup and again at track 40. The timed speed in bytes of the source and target drives and the difference between them is displayed after each Speed Analysis. The closer the source and target drive speeds when using the Hardware Device, the more accurate the backup. It is favorable if the target drive has the slower motor speed, ie: the drive that can hold the most data.

If 'Index Copy' or 'Index Sync' are On when the Hardware is used, before the transfer can begin the indexes on each drive need to be aligned. PowerCopy will pulse the drive motor of the source or target drive on and off to bring the indexes into alignment. Many tracks which do not have a SyncWord and are index synced may not need the indexes aligned, so you can press the left mouse button to start an immediate data transfer, aborting the index alignment. With some 5¼" and 3½" drives, index alignment may be difficult if the motor latch circuitry has not been done to the Commodore standard. If PowerCopy has trouble aligning indexes, try increasing the Index alignment accuracy from the Preferences window. The byte distance between indexes is displayed in the Alignment window if PowerCopy has to pulse the drive motors to align indexes. See also Track Analysis, Index Alignment, Motor Pulse and Multiple Targets.

Index Copy

Index Copy when On waits for the disk index pulse before scanning for the SyncWord when reading a track and waits for the index pulse before writing a track. Index Copy can be On to backup virtually all software, but the disk backup will be slower than necessary, if Index Copy was not required. Index Copy Auto tests the Index requirements of each track after being read and if necessary changes the current Index Copy On, Off Status, and rereads the track before continuing. If Index Copy Auto is selected, during the backup the displayed Index Copy On, Off status displays On or Off only according to each tracks index requirements, but will redisplay Auto on completion of, or aborting the current disk operation. Index Copy Auto is approximately 98 percent accurate and is therefore an excellent alternative to using Index Copy On and waiting longer for backup completion if Index Copy was not required. Note: Backup mode Parameter always overrides Index Copy Auto.

Fix Errors

Fix Errors will repair as many sectors on a DOS track as possible, repairing sector headers and checksums, but not errors within the data itself. If the errors are in graphics or sound they will be corrupted but the software should still run. If the error is in processor code the software will load, but probably crash. If no sectors can be fixed or the track is non DOS the target track will be formatted. Fixed errors will be white instead of black on a standard palette. Fix Errors should only be used to correct DOS errors as errors could be disk protection. Fix Errors will also slow down the backup. Fix Errors On will reconstruct every track while Fix Errors Auto will reconstruct tracks with errors only. If fixed errors were on Amiga DOS file disks, checksums will probably have to be fixed at the file level also.

Errors are relative to a standard Amiga DOS track, so errors displayed for a non DOS protected track should be treated as a reference only. The following error table is also available from the 'Special' menu in PowerCopy.

Table of Errors and Track Status Codes which can appear in the error grids

0	.....	.Amiga DOS Track with no Error
1	.....	.Sector Header will not be Found by DOS
2	.....	.Non Standard SyncWord
2	.....	.As Above: Blank Track, Bad Read or Protection
3	.....	.Bad Sector ID, Probably Non DOS
3	.....	.As Above: Blank Track, Bad Read or Protection
4	.....	.Incorrect Sector Header CheckSum
5	.....	.Incorrect Sector Data CheckSum
6	.....	.Not Enough DOS Sectors Available
7	.....	.Incorrect Track Number in Sector Header
8	.....	.Incorrect Sector Numbering in Sector Header
9	.....	.Incorrect Sector and Header CheckSum
S	.....	.No SyncWord Found, Track Index Synced
L	.....	.Long Track, Shown Only if Speed Adjust is Off
F	.....	.Source Unfixable, Target Track Formatted
x	.....	.Error Verifying Non DOS ReRead
X	.....	.Error Verifying Written Data or Bad Compare
R	.....	.Track Write Retried, Verify Grids Only

Verify Data

Verify Data is used to verify the writing of DOS and non DOS tracks, non DOS rereads, Retry Errors and bad track reads. If a written track does not verify, it will be rewritten and verified the number of times in 'Verify Count'. With non DOS tracks there is no way of knowing if a track read is good, so PowerCopy will reread the source track and test for the same data. If the reread matches, one can assume the read is good, if not the track will be reverified the number of times in 'Verify Count'. If a verify error occurs on a non DOS track a message will show the offset into the data where the error occurred. The 'Data Length' gadget may be needed with non DOS tracks if bad verifies are given on tracks with the error at approximately the same offset. See Helpful Hints for Backing up Software for more information. Note PowerCopy will not verify errors '2', '3' or Index Synced tracks.

Verify Count

Verify count is the maximum number of retries for verifying written data, non DOS rereads, read Retry Errors, bad track reads and 'Disk Compare' reads. The maximum value is 999. If a known good disk develops an error, you could set a large 'Verify Count' to attempt to get a good backup of the original.

Retry Errors

The default read errors to retry are '1', '4', '5' and '9' as these are the normal common DOS errors, however there is a small chance that other errors could develop on a DOS track. The number '0' could be used with Checkdisk to look for a suspected intermittent error on a standard DOS track. Using other retry error numbers on protected disks will slow down reading unnecessarily.

Message Speak

Turns speaking of status and selection messages On and Off. If the Disable loading of speech gadget has been turned off from the Preferences window, the Narrator.device must be in the 'Devs' directory and Translator.library in the 'Libs' directory of the current boot drive for speech to work, or a corresponding error message will be given. If a new message is issued when speech is already in progress, the current speech will be aborted and the new message given. If preferred the Translator.library and Narrator.device from WorkBench1.3 can be used instead of the first release of WorkBench2.0, as they have a different sound and are smaller files. If Speech is not required or more free memory is needed, select the 'Disable loading of speech' gadget from the Preferences window and save it using 'Save Defaults'. This will speed up the loading of PowerCopy and free up to 76300 bytes of memory.

Speed Adjust

If Speed Adjust is On, PowerCopy will pause and open a window displaying the target drive speed and a message with the read track length to adjust your drive speed to, if the first read track length exceeds or equals the initial pause length set in the Preferences window, or if following track lengths vary by more than twenty words. For Speed Adjust Off only, the status code 'L' will be displayed in the error grids to show the presence of long tracks. To use the 'Speed Adjust' option a drive with motor speed control is required. See also the paragraph on Understanding Data Storage and Disk Protections.

Format Method

Format Method allows selection of Quick format so the Format Target option when selected will write a new boot block and an empty root directory, instead of formatting the selected track range. A Quick format is equivalent to erasing all files from a formatted disk, renaming and installing it. Options are also available for the Fast file system, International mode and Directory caching. These options are applicable to the correct KickStart versions only and also apply to the 'Install boot' function. See also Format Targets.

Length Values

Length Values allows the displayed values for 'Read Length' and 'Drive Speed' to be changed between Hex and Decimal. Values are in Words (two bytes).

Disk Side Menu

Lower Side

Use the lower disk side (side zero) for disk operations.

Upper Side

Use the upper disk side (side one) for disk operations.

Both Sides

Select and use both sides of the disk for disk operations.

Start Side

Select start side zero or start side one for disk operations.

Special Options

ERRORS *Errors & Codes*

Status Errors will display a list of all track errors and status codes that could be displayed in the track error grids or target verify grids.

SLEEP *Resident Sleep 'Del'ete*

Resident Sleep closes the PowerCopy screen, leaving PowerCopy resident in memory. Press both mouse buttons simultaneously to return. As only one PowerCopy can be running, if you forget PowerCopy is sleeping or active with its screen behind another and try to load it again, that PowerCopy will wake up the current resident PowerCopy or bring the active screen to the front and exit. If you have loaded other software during 'SLEEP' and try to return to PowerCopy and there is insufficient memory to open the PowerCopy screen, all screens will be beeped. Unload something and try again if this happens.

READ *Read One Track*

Read one track reads the selected start track and side into the disk read and write buffers except when reading a track with backup mode Index Sync which will read the selected track directly into the disk write buffer only. The 'BUFFERS' function can be used to display or analyze the read track.

WRITE *Write One Track*

Write one track writes the disk write buffer back to the current start track and side. The disk write buffer will contain the data from the last track read or data from the last track written if the previous operation was a write only function such as Format, Erase, Write memory or Write KickStart. The disk write buffer can be written back to a different track if required.

Write RAM Data

Write RAM Data writes memory to the selected track range starting from the address entered in the 'Mem Address' string gadget. The address must be Hex and have no '\$' prefix, eg: start of KickStart version 2.0+ is 'f80000'.

Write KickStart

Write KickStart writes the current version of ROM based KickStart from the computer PowerCopy is running on, to the target drive in the format required for an Amiga 1000. Use only for restoring an original Amiga KickStart disk that has become corrupt, as KickStart is Copyright to Commodore Amiga Inc.

Multiple Speeds

Drive Speed displays the drive speed of the selected target or target drives if backup mode Multiple is selected. Hex and decimal byte and word lengths, R.P.M. and rotation time are displayed. The default speed test track of 160 which is track 80, side 0 normally contains no data. If using track numbers from 0 to 159, use a disk with unwanted data. The speed test track can be changed from the Preferences window. See also Drive Speed Test Track.

Reselect Drives

Reselect Drives retests and enables use of floppy drives turned on after PowerCopy has been loaded. This can be used if you forgot to turn on a drive.

DRIVES

Overlays the main gadgets with gadgets to select source, target, multiple targets, copy modes 'Quick' and 'Multiple', drive Ready and Index signal tests, drive speeds, retest available drives and one to display the verify grids. The gadget labeled 'AES' stands for All drives Except Source.

DEVICE

Overlays the main gadgets with gadgets to select source, target, multiple targets, clear RAM drive (equivalent to erasing target drive RAM), delete all device track files from the current device path, make or delete the current device directory and a fast way of selecting the device path by using the File Requester. The device used is typically a harddrive, CD ROM or RAM: but cannot be a floppy drive. RAM: cannot be used with early KickStart versions.

ASSIGN *Assign Enter*

After selecting Assign, the next menu option or gadget selected will be assigned to the Enter key on the numeric keypad. The default for the numeric Enter key is 'START' backup. The main Return key is always 'START' backup.

About PowerCopy

Gives the current software version number, authors and distributors name, etc.

Defaults Menu

Load Defaults

Loads the 'PowerCopy.Config' file from disk and resets all the options as per 'Save Defaults'. The config file is auto loaded when PowerCopy loads, if it exists in the 'S' directory of the floppy or harddrive your Amiga booted from.

Save Defaults

Saves to disk the following settings; Source, Target and Multiple target drives, Format Name used with Rename DOS disk and Format Target, Backup Mode, Hard Device, Index Copy, Fix Errors, Verify Data, Say Messages, Speed Adjust, Verify Count, Retry Errors, Format Method, Hex or Decimal length values, Clock mode, Function assigned to numeric enter, Color mode and current Normal color and Stripe color palettes, Drive speed test track, Speed adjust length, Drive head step delay, Head settle delay, Index alignment accuracy, Index align motor pulse, Write overlap distance, PowerCopy task priority, Frame count read timeout, Fill word for track erase, Mouse double click delay, Message scroll delay, Screen lower line limit, Speech speed, Pitch of speech, Speech sampling rate, Information scroll message on, Disable loading of speech, Install bootblock with format, Enable floppies with file work, Auto index alignment accuracy, Erase parameter NoCopy tracks, PowerCopy.docs path, Parameter directory and Current DEvice file paths, Screen mode and the Swap gadget line. The default file 'PowerCopy.Config' must be in the 'S' directory of the boot drive or floppy if defaults are to auto load when PowerCopy loads.

PREFS *Open Defaults*

Opens the Preferences window to edit string gadgets for the drive speed test track, initial track length to pause on if 'Speed Adjust' is On, delay for drive head stepping, track head settle delay for when track to be read or written is reached, required index alignment accuracy, motor pulse width to align indexes, write overlap distance from SyncWords, PowerCopy task priority, track read timeout in display frames, word value to erase tracks with, mouse double click delay for setting start and end tracks to the same value and grid disk side gadgets, delay in seconds until the information scroll message, screen lower line limit, speed of narrated speech, pitch of narrated speech, speech read sampling rate and 'PowerCopy.docs' and Parameter directory file paths. There are On and Off tick gadgets for disabling the information scroll message, installing a bootblock when formatting, disabling the loading of speech, enabling floppies with file reading and writing when not using a harddrive, preventing the clearing of error codes in the error grids when using the function 'SELECT', disabling the printing of error code 'L' with long tracks, automatic setting of the Index alignment accuracy value for optimum speed and accuracy and one to erase target tracks marked NCPY (NoCopy) when using Parameter copy. There are also gadgets to set the default values for this window only, cycle colors, load and save PowerCopy defaults, give a Palette Requester, toggle background color from normal to stripes and toggle between an Interlace and non interlace screen, if PAL mode is available.

DEFAULT *Default Prefs*

Sets PowerCopy main window defaults to; Track Range 00-79, Start Side 0, Disk Sides Both, SyncWord \$4489, Data Length \$0000, Source Drive 0, Target Drive 1 or RAM, Multiple Targets All, Format Name PowerCopy, Backup Mode Quick, Hard Device Auto, Index Copy Auto, Fix Errors Off, Verify Data Off, Say Message On, Speed Adjust Off, Verify Count 003, Retry Errors 1459, Format Method normal and OFS, Length Values hexadecimal, Colors normal, Swap gadget line to 'INFO, RENAME, INSTALL, DRIVES and DEVICE' and numeric Enter assigned to 'START' backup. To set the defaults for the Preferences window, press Backspace from the main window or select the 'DEFAULTS' gadget from the Preferences window. The last user loaded defaults can be selected by holding a Shift key while selecting either of the 'DEFAULTS' gadgets or pressing the backspace key.

Color Palette

'Normal Colors' and 'Color Stripes' can be customized using the Color Palette Requester. If changing 'Color Stripes' the color change will only be at the top of the screen until the Requester is closed. For a sensible color stripe selection PowerCopy restricts the first color stripe value to under nine.

Color Stripes

Color Stripes changes the background to different shades of color stripes.

Normal Colors

Normal Colors selects the normal background color, without any color stripes.

P r e f e r e n c e s W i n d o w O p t i o n s

Drive Speed Test Track

The Drive Speed Test Track value counts from disk side to side, so the default value of 160 is track 80 side 0 which normally contains no disk data. If using track numbers between 0 and 159, use a disk with unwanted data.

Speed Adjust Pause Length

The default value of 6400 decimal words, is the initial minimum track length PowerCopy will pause on for drive speed adjustment if 'Speed Adjust' is On.

Delay for Drive Stepping

The Head Step Delay value controls the speed at which your drive head seeks from track to track. The default value of 3000 is also used by DOS. Using too small a value will cause read errors or total drive head seek failure. Quality drives in good condition may handle values around 1500, but values under 2000 are not recommended. The maximum usable value is 65536.

Track Head Settle Delay

When the drive head is seeked to a track which is going to be read or written, a secondary delay should be given to allow the drive head time to settle. DOS uses a delay value of 15000 which is longer than required. The default value is 6000 and the maximum usable value is 65536.

Index Alignment Accuracy

Index alignment accuracy applies to tracks with Hardware Device and Index requirements which also need the drive motors pulsed to align indexes. The default value of 64 decimal is the maximum number of bytes between the source index and the target drive index allowed, before data transfer can begin. The larger the value, the worse the accuracy, but the faster the index alignment. The smaller the value, the slower but more accurate the alignment. Some single track protections may require 20 to 50 bytes accuracy while full disks requiring Index Copy may backup correctly with values as large as 100 to 900. Note: Auto index alignment accuracy must be disabled for manual selection.

Index Align Motor Pulse

The Index align motor pulse value is used to pulse the source and target drive motors on and off to align the indexes if both drive speeds are the same. Normally the difference between source and target drive speeds will drift the indexes into alignment. Indexes are aligned when the timed byte count between indexes, displayed in the alignment window, reaches a value less or equal to the

requested Index alignment accuracy. If the default value of 00 needs to be changed, turn off Auto index alignment accuracy and increase the motor pulse value in increments of approximately 2000 until the value is sufficient to move the indexes into alignment. The drive motors are always pulsed until the indexes are between + or - 1280, depending on which drive is faster to obtain correct drift direction with 00 pulse value. The default value can be experimented with to try to speed up index alignment, but the drift alignment technique is far more accurate. As the drift alignment technique is more accurate, if your source and target drive speeds are identical try another target drive if available or consider asking a friend if they are prepared to swap external disk drives. The Index alignment accuracy value can also be increased to make index alignment easier. See also Index Alignment Accuracy.

Write Overlap Distance

Write Overlap is applicable to tracks copied with the Hardware Power Device only. The default of 20 bytes is the distance between the SyncWords at the start of the track data and where the data transfer stops and overlaps. Some software may possibly require this overlap to be closer to the SyncWords or further away. Specifying too large a value may damage the end of program track data, while too small a value may cause some tracks to overlap the SyncWords at the start of the track data, destroying the backup.

PowerCopy Task Priority

Sets the PowerCopy task priority. If the value entered here is not '00', the value entered is taken as a negative value. Usable values are 0 to 127. If you require other running tasks to have more processor time, increase the default value of '00'. The lowest priority is -127 and the highest is 00. Note: Multitasking is not recommended when using IndexSync, Nibble backup modes or the Hardware Power Device as interrupts are turned off for long periods of time. Multitasking with backup mode Quick and Index Copy On is acceptable but difficult as interrupts are also disabled with Index Copy On.

Frame Count Read Timeout

Frame count is the number of video display frames to elapse before PowerCopy will timeout waiting for a track read to commence with the current SyncWord. PAL video refresh rate is 50 times a second while NTSC is 60. One disk rotation is .2 seconds so on PAL machines the default value of 20, which is .4 seconds, will cause a disk read to timeout after two disk rotations. A value of 10 could be used here to timeout after one disk rotation, speeding up SyncWord scanning, but it is possible that the correct SyncWord may be missed.

Fill Word for Track Erase

This word value is written to each track when using the function Erase targets. The default value of 00 will restore a disk back to an unwritten state. Other common values that may be used are 43690 (\$aaaa) which is the standard gap fill value and is used by some software as the default track clear value or 65535 (\$ffff) which results in zeros being read back with most disk drives.

Mouse Double Click Delay

Double Click Delay is the maximum time between clicking the same error grid coordinate to set start and end tracks to the same value or when selecting the disk side label gadgets in the error grids. The default value of 25 allows for half a second delay between left mouse clicks. The maximum value of 99 allows for up to two seconds between clicks.

Information Scroll Delay

Scroll Message Delay is the time in seconds before an information scroll message begins printing in the status box. Pressing keys or mouse buttons resets the delay. The default value of 600 gives ten minutes before the scroll message appears with no mouse or key activity.

Screen Lower Line Limit

This is the display line limit to lower the screen to, if the gadget to raise and lower the screen, in the top right corner of the display, is selected. As the screen is moved in increments of twelve lines at a time, the value entered is automatically rounded down to the nearest value divisible by twelve.

Speed of Narrated Speech

The Speed of Narrated Speech value determines the number of words spoken per minute. Usable values are 40 to 400 WPM. The default is 200 WPM.

Pitch of Narrated Speech

The value entered here is the baseline pitch of the narrator speaking voice. Usable values are 65 to 320 hertz. The default value is 72 hertz.

Speech Read Sampling Rate

Changing the sampling frequency affects the pitch and formant tunings and can be used to create unusual voice effects. The usable range is 5000 to 28000 and the default value is 20096.

COLORS

Cycles through seven predefined palettes for Normal Colors and Color Stripes. Each predefined palette can be customized and saved using 'Save Defaults'.

STRIPES

Toggles the background color between 'Stripes' and 'Normal' background color.

SCREEN

Screen mode toggles the display screen between non Interlace and Interlace, providing your Amiga is in PAL mode. If PAL mode is not available PowerCopy will be restricted to an Interlace display only. Note that fine adjustment of vertical position on some monitors can greatly improve an Interlace display.

Drives Menu

Select drives using the Drives menu, 'DRIVES' or 'DEVICE' gadgets which include multiple target selection or F1-F5 for the source and F6-F10 for the target. Shift F5 and Shift F10 will select DEV instead of RAM. PowerCopy will load with the first available target drive or target drive RAM if only one drive is available. The source and target drives can be reversed by selecting the double arrowed gadget labeled 'Swap Drives'.

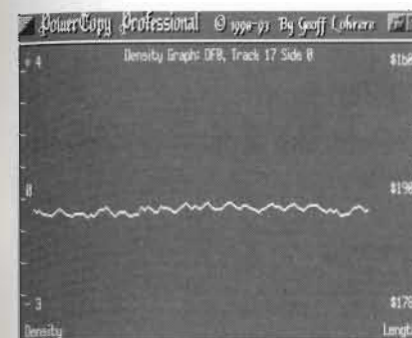
Harddrive Installation

To install PowerCopy onto a harddrive, boot the original PowerCopy program disk and select the Harddrive Install option from the PowerCopy and Utilities menu. From the Harddrive Install window the harddrive can be selected using the device or volume name followed by a colon eg; 'DH0:'. The device name can also be followed by a path eg; 'DH0:Utilities'. The string gadget labeled 'PowerCopy drawer and files:' is for entering the path where you would like the PowerCopy and Parameters directories (drawers) and the Bootblock directory for PowerBoot to be created. The string gadget labeled 'Boot partition with drawers C, S, Devs, Libs and Fonts:' is for entering the device or volume name of the partition your harddrive normally boots from and has the directories 'C', 'S', 'Devs', 'Libs' and 'Fonts' eg; 'DH0:'. If any of the directories do not exist, the harddrive install program will create them. The 'Libs' directory should also have the file 'Diskfont.library'.

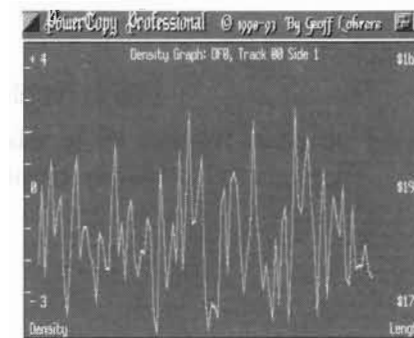
The Install program can be used for first time installation and PowerCopy updates. If possible use the Install program as all the required files will be transferred, including new or updated parameter files. Unless the disk is already inserted, at the end of the installation, the install program will request the Parameters disk to be inserted in any drive. Some parameters are occasionally renamed on new versions of the Parameters disk, so you may want to delete parameters from a previous install before reinstalling PowerCopy. If your harddrive is broken into several different paths, the following are the files required to copy PowerCopy to a harddrive manually;

POWERCOPY Directory:	PowerCopy, PowerCopy.docs (Power Utilities etc.)
S Directory:	PowerCopy.Config (defaults are used if no config file)
S Directory:	PowerCopy.SyncWords (defaults are used if no SyncWord file)
C Directory:	PALNTSC (changes display from NTSC to PAL if required)
C Directory:	PowerDocs (to display these docs from icon on harddrive)
DEVS Directory:	Narrator.device (needed if speech required)
DEVS/MONITORS Directory:	PAL (for file PALNTSC if using KickStart 2.0+)
FONTS Directory:	Power.font
FONTS/POWER Directory:	8, 10 and 12
LIBS Directory:	Req.library and Diskfont.library
LIBS Directory:	Translator.library (needed if speech required)
PARAMETERS Disk:	all files if required

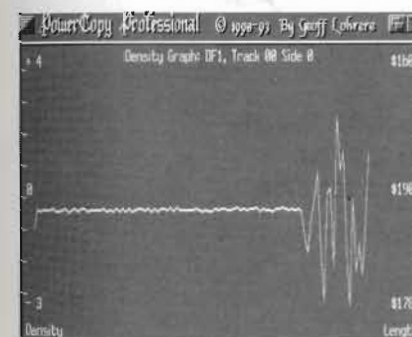
Examples Of Analysis Graphs



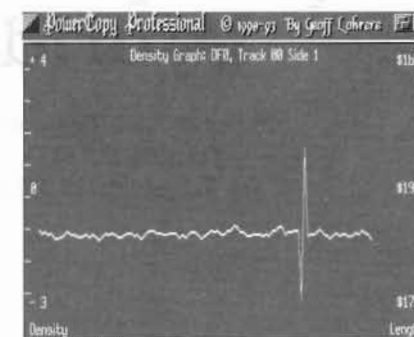
Normal track graph which can deviate with different drives or disks.



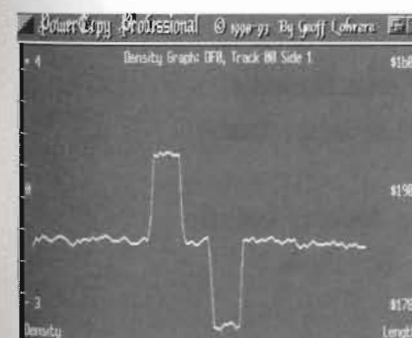
Completely erased or blank track.



Track with erased or unwritten area. Jagged area is erased portion of track.



Sawtooth wave protection which is not very common.



Square wave protect which is very common. Normally Track 0, Side 1.

Don't forget to register

Updates and new product information will be mailed to all registered users of PowerCopy Professional.
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